

**SECTION 15128  
STAINLESS STEEL PIPING SYSTEMS  
(CERTIFIED MATERIALS)**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawing and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

**1.2 SUMMARY**

- A. This Section includes Stainless Steel piping systems intended for severe service applications with 32 °F (0 °C) to 366 °F (186 °C) temperature range and 150-psig maximum pressures.
- B. This Section also includes primary Carrier Pipe (**inner**) for above and below grade low pressure and low temperature drain piping systems that require secondary confinement, and low pressure, and low temperature drain piping systems that do not require secondary confinement as indicated on drawings. These systems are as follows:
1. Process Secondary Confinement Waste (PSCW) systems.
  2. Low Level Liquid Waste (LLLW) systems.
- C. Secondary piping (**outer**) for double containment piping systems shall be in accordance with Section 15146, Stainless Steel Piping Systems –(Non-certified Materials).
- D. Related Sections, if applicable:
1. Division 15, Section 15050, Piping Systems.
  2. Division 15, Section 15067, Special Piping Materials.
  3. Division 15, Section 15072, Cleaning.
  4. Division 15, Section 15073, Pressure/Leak Testing.
  5. Division 15, Section 15074, Identification and Labeling.
  6. Division 15, Section 15075, Disinfection.
  7. Division 15, Section 15100, Valves.
  8. Division 18, Section 18100A, General Welding Requirements for Target Building Systems.

**1.3 REFERENCES**

- A. The American Society of Mechanical Engineers (ASME):
1. ASME B16.21-92, Nonmetallic Flat gaskets for Pipe Flanges.
  2. ASME B31.3-96, Process Piping.
- B. American Society for Testing and Materials (ASTM):
1. ASTM A193-97a, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature Service.
  2. ASTM A194-97, Standard Specification for Carbon and Alloy-Steel Nuts and Bolts for High Pressure and High Temperature Service.
  3. ASTM A380-96a, Standard Practice for Cleaning, De-scaling, and Passivation of Stainless Steels Parts, Equipment, and Systems.
  4. ASTM D4894-97, Standard Specification for PolyTetraFluoroEthylene (PTFE) Granular Molding and Ram Extrusion Materials.

#### 1.4 SUBMITTALS FOR APPROVAL

- A. Product Data: Provide shipping and installed operating weights; specialties and accessories furnished. Indicate dimensions, required clearances if required, and description of procedures of assembly of various components, piping and wiring connections as required.
- B. Prior to start of fabrication, submit for approval the following to the Construction Manager:
  - 1. Design Data: Large scale (not less than  $\frac{1}{4}" = 1' 0"$ ) layout drawings indicating all pipe runs, joints, fittings, accessories and supports. Indicate in sufficient detail to verify that products meet or exceed specified requirements. Identify piping deviation from the referenced design drawings.
  - 2. Certified material test reports (CMTRs).
  - 3. Specimen Selection Procedure and Laboratory Corrosion Test Reports.
  - 4. Material identification (mill certified).
  - 5. Material Trace ability procedure
  - 6. Material control procedure.
  - 7. On critical systems, submit prior to leak testing the Piping Leakage Test Procedures for approval as designated on drawings.
  - 8. Delivery schedule.
- C. Submit for approval upon the completion of work, completion of test, or prior to concealment of piping system.
  - 1. Test and Inspection reports
  - 2. System leak test reports with attachments
  - 3. Copies of non-conformance / deviation reports.
  - 4. Material certifications complete with full trace ability back to the manufacturer's heat numbers.
  - 5. Trace ability documents.
  - 6. Weld maps.
- D. Submit for approval upon the completion of work redlined "as-built" drawings.
- E. Provide Certified documentation of material Bending Process utilized.
- F. Cleaning Plan based on Paragraphs 6.3 and 6.4 of ASTM A380 (without passivating or pickling).
- G. Certified documentation of Bending Process.
- H. Bolting Procedure.

#### 1.5 SUBMITTALS FOR INFORMATION

- A. Weld-map-associated Weld Reports.

#### PART 2 - PRODUCTS

- 2.1 MATERIALS: Use materials selected from list below. Material Specifications of Section 15067 establish requirements for special piping materials.
  - A. Pipe (Schedule 10S): Material Specification MS-07-SS-4, Section 15067.
  - B. Pipe (Schedule 40S): 1  $\frac{1}{2}"$  & smaller, Material Specification MS-07-SS-6, Section 15067.

- C. Pipe Fittings (Schedule 10S): Material Specification MS-07-SS-8, Section 15067.
- D. Pipe Fittings (Schedule 40S): Material Specification MS-07-SS-10, Section 15067.
- E. Flanges (Schedule 40S): Material Specification MS-07-SS-12, Section 15067.
- F. Flanges (Schedule 10S): Material Specification MS-07-SS-13, Section 15067.
- G. Tubing: Material Specification MS 07-SS-14, Section 15067.
- H. Gaskets: non-asbestos reinforced Teflon PTFE, ASTM D4894, 1/8-inch-thick, and flat ring, ASME B16.21.
- I. Bolts: AISI Type 304 Stainless Steel, ASTM A193 Grade B8 Class 1, semi-finished heavy hex head, UNC threads.
- J. Nuts: AISI Type 303 Stainless Steel, ASTM A194 Grade 8F, semi-finished heavy hex, UNC threads.
- K. Tube Fittings: Material Specification MS-07-SS-15, Section 15067.
- L. Bar: Material Specification MS-04-SS-5, Section 15067.
- M. Plate: Material Specification MS-04-SS-25, Section 15067.
- N. Sheet/Strip: Material Specification MS-04-SS-50, Section 15067.
- O. Valves: For details, see each Valve Data Sheet: Section 15100, "Valves".

Priority shall be given to use Ball type (V-1181) valves for "Shut-off" or "Isolation" or "Balancing" functions.

<u>Service</u> <u>Shutoff</u>	<u>Size (in.)</u>	<u>Data sheet Valve</u> <u>Number</u>	<u>End type</u>
Ball Exception:	1/2" to 12" Ball valves to be installed in LLLW piping systems	V-1181A ( Note 1 ) In Bldg 8520 & Utility Vaults	Flanged Butt-welded
Check	1/2" to 2"	V-6115A ( Note 1 )	Socket welded
Gate	1/2" to 6"	V-59A ( Note 1 )	Flanged
Globe	Less than 4"	V-6032A ( Note 1 )	Flanged
	6" & larger	V-1118A ( Note 1 )	Flanged

- P. Gate & Globe Valve Stem Packing (*for repacking only*): non-asbestos, Teflon PTFE, ASTM D4894, Chevron type, 1/8-inch and greater, John Crane Chemlon Type C-VH.
- Q. Gate & Globe Valve Bonnet Gaskets (*for replacement*): non-asbestos reinforced Teflon PTFE, ASTM D4894.
- R. Filler Materials for welding: Section 18100A, "General Welding Requirements for Target Building Systems".

- S. Marker (for Stainless Steel surfaces): Maximum 250 ppm (parts per million) by weight chlorides, fully soluble in water.
- T. Solvent: Potable water containing maximum 15-ppm total halides.
- U. Wire Brush: Stainless Steel.
- V. Grinding Wheel: New or previously used on Stainless Steel only.

## 2.2 FABRICATION

- A. Maintain identification on pipe materials during fabrication for trace ability. Transfer tubing and pipe markings, IR number, and heat number by vibro-etching onto tubing or pipe to be cut prior to cutting to ensure trace ability.
- B. Maintain pipe in clean condition throughout fabrication process to preclude large scale re-cleaning of materials. Perform additional cleaning required as part of fabrication process.
- C. Exercise controls during fabrication of Stainless Steel equipment to minimize exposure of metal to contaminants, particularly halides that cause stress-corrosion cracking and pitting corrosion. If halide-bearing compounds are used, remove them by cleaning equipment after fabrication.
- D. Use solid compounds or markers that contact Stainless Steel surfaces that contain no more than 250 ppm by weight of chlorides and are fully soluble in water.
- E. Bending:
  - 1. Use bending to maximum extent possible in lieu of fittings.
  - 2. Make bends per flattening and thinning requirements of ASME B31.3.
  - 3. Use cold bending process only.
- F. Cutting/Grinding:
  - 1. Cut pipe by sawing, shearing, machining, plasma cutting, or grinding.
  - 2. Grind cut edges that are not to be welded to eliminate shear cracks and gouges and to produce a clean, bright surface.
  - 3. Overlay pipe and sheet ends identified on drawings with weld material to cover exposed end grain of metal for corrosion-resistance purposes.
- G. Flanged Joints:
  - 1. Seal flanged joints by torquing bolts with calibrated torque wrench to values specified:
    - a. For pipe sizes up to 3-inch: Torque 40 to 60 ft-lb.
    - b. For pipe sizes 4-inch and greater: Torque 60 to 90 ft-lb.
  - 2. Torque bolts in incremental steps.
  - 3. Use tightening pattern that does not distort flanges.
- H. Welded Joints: Perform welding activities per Section 18100A, "General Welding Requirements for Target Building Systems":

## 2.3 SOURCE QUALITY CONTROL

- A. Bending Process Certification:
  - 1. Base bending process certification data on a minimum of three sample bends of each pipe size bend made by each piece of production equipment.
  - 2. Perform liquid-penetrant examination on sample bends to detect cracking.
  - 3. Section and measure sample bends to demonstrate compliance with ASME B31.3.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install piping system per Normal Fluid Service requirements of ASME B31.3 and Section 15050.
- B. All Stainless-Steel sleeves and Stainless Steel piping embedded in concrete shall be wrapped with 3M Scotchrap 51, used in conjunction with Scotchrap primer.
- C. Perform welding activities per Section 18100A, "General Welding Requirements for Target Building Systems".
- D. Identification/Labeling: Section 15074.

### 3.2 REPAIR/RESTORATION

- A. Repair defective welds.
- B. Re-inspect and re-examine repaired welds.

### 3.3 FIELD QUALITY CONTROL

- A. Pressure/Leak Test: Section 15073, Class A.
- B. Bends: Test and examine bends in pipe and tubing per 100% liquid-penetrant examination requirements of Section 18100A, "General Welding Requirements for Target Building Systems".
- C. Weld Examination: Examine welds per Section 18100A, "General Welding Requirements for Target building Systems".

### 3.4 CLEANING

- A. Clean AISI Type 304L Stainless Steel in a manner that does not introduce halides to pipe surface (inside or outside) and which provides a clean interior surface, free of oils, cutting fluids, nitrides, oxides, carbides, dirt, dust, and moisture.
- B. Clean Stainless Steel piping materials prior to welding operations and after cutting of pipe.
- C. Re-clean piping materials prior to welding if an intermediate operation is performed after cleaning, including cutting, grinding, previous welds, or other operations in which the protective seal is removed and pipe's interior is contaminated.
- D. Hand wipe exterior and interior surfaces 1 inch back from weld face with solvent-wetted cloths. Change cloths frequently. Stop wiping when cloths remain clean.
- E. Use lint-free cloth swabs to dry pipe, fittings, and valves. Change swabs frequently. Stop drying when swabs come out clean and dry.
- F. Use hand brushing to clean localized rust or stain spots resulting from high-speed brushing.

**END OF SECTION 15128**